NREL/JA-810-31967
July 2002

Secure Energy for our Nation's Security

September 11 changed America. It changed our belief that our shores were immune to attack. It changed the way in which many of us do business. It changed our idea of how our freedoms and our security are intertwined.

And it changed our concept of how important energy security—especially in the form of homegrown and diverse energy supplies—is to national security.

President Bush has stated that "one of the keys to energy security in America, and national security, is to have a diversified energy base," and that "Over-dependence on any one source of energy, especially a foreign source, leaves us vulnerable to price shocks, supply interruptions, and…blackmail."

Blackmail, indeed, and worse—sabotage of energy supplies in an effort to choke the vitality of our economy, eviscerate the vigor of our way of life, and curb our hard-won freedoms.

It is no wonder, then, that Secretary of Energy Spencer Abraham has stated that ". . . energy and science programs should be judged by whether they advance this nation's energy—and hence, national—security."

The R&D that NREL performs for the Department of Energy on renewable energy and energy efficiency is well placed in this regard.

(Top) Wind turbines generate electricity for a U.S. Naval base on San Clemente Island. (Center) Solar wall provides heat and ventilation for a helicopter maintenance hangar at Fort Carson in Colorado Springs. (Bottom) A solar electric panel supplies power for refrigerating vaccines at a remote health center. (Background) Biomass-derived fuel supplements fossil fuel used in a U.S. Army vehicle. Solar arrays provide 15 kW of supplemental power for the Pentagon.

When NREL began its mission 25 years ago, the popular refrain was, "No one can embargo the sun." Well, no one can embargo or disrupt energy that isn't spent, either—such as the energy saved through energy-efficient technologies. We can incorporate energy efficiency into every home, building, business, industry, and vehicle. And the simple fact is, the more efficient you become, the less vulnerable you are to disruptions of energy supply.

And renewable energy? The technologies and the energy resources for renewable energy are homegrown. We unravel the science, develop the technologies, and manufacture the systems here, in America. And the resources themselves—sunshine, wind, water, biomass, and the heat of the Earth—are vast, ubiquitous, safe, and uninterruptible here, in America.

And it is in America that we can use these resources and technologies to enhance national security. We can enhance it directly through our national defense by using energy efficiency technologies to improve fuel efficiencies for a wide range of weapons platforms and to

make supply lines less vulnerable. We can employ biomass-derived fuels to supplement other fuels for strategic military purposes. And we can deploy photovoltaic systems for remote or mobile field service.

Photovoltaic systems, in fact, have long played an important military and strategic role. They are the preferred power supply for the Earth-orbiting satellites that the U.S. military and intelligence agencies rely on for gathering and communicating information from around the world.

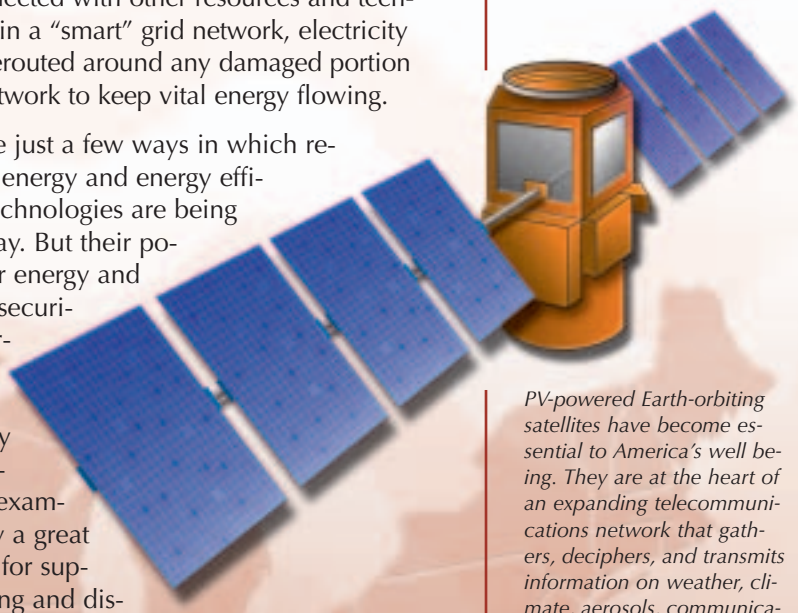
But renewable energy and energy efficiency technologies are equally important for other aspects of our national security. For example, certain liquid desiccants—often used for building dehumidification and cooling—are well known for their ability to absorb water. But they also can absorb a wide variety of suspended particles from the air, including potentially pathogenic bacterial and fungal spores. As a consequence, air-conditioning equipment based on liquid desiccants may prove to be a valuable technology for removing and destroying potential airborne pathogens—depending on how well the liquid desiccant-based air conditioner can remove these particles from the air and how effective the liquid-desiccant material is in deactivating the absorbed pathogens. Currently, researchers are investigating both of these issues.

Bacteria and viruses can also be easily filtered out of our water supply with an R&D 100 Award-winning technology developed by NREL and its partners. This technology is based on nanoscale ceramic fibers that have an extremely high surface area and a chemical affinity that makes them particularly adept for filtration of microbial pathogens and viruses whose sizes range from a few nanometers to a few micrometers. This material is also ideal for purifying blood plasma, sampling and detecting pathogens in lakes and streams, and removing heavy metals from water.

And consider again those PV-powered, Earth-orbiting satellites. They are at the heart of telecommunications, which has become fundamental to the way the nation communicates and does business. Telecommunications also has become extremely valuable in times of disaster—natural or man-induced—for keeping communications open and for locating people and areas of concern. And because photovoltaics and other renewable energy systems are portable and can be employed stand-alone, in times of disaster they can be used to refrigerate vital medical supplies and to provide power for critical services.

Renewable energy and energy efficiency technologies represent the ultimate distributed resource. For example, renewable electric technologies—photovoltaics, wind energy, concentrated solar power, bioelectric units—add redundancy, security, and reliability to any system, whether for a single home, a business, a repeater station, a community, or for an entire grid network. With renewable electric systems interconnected with other resources and technologies in a "smart" grid network, electricity can be rerouted around any damaged portion of the network to keep vital energy flowing.

These are just a few ways in which renewable energy and energy efficiency technologies are being used today. But their potential for energy and national security is enormous.



PV-powered Earth-orbiting satellites have become essential to America's well being. They are at the heart of an expanding telecommunications network that gathers, deciphers, and transmits information on weather, climate, aerosols, communications, oceans, volcanoes, trace gases, storms, disasters, troop movements, and much more.

Bioenergy technologies, for example, carry a great prospect for supplementing and displacing imported fossil fuels and for supplying feedstock for chemicals, fibers, and other materials. And one day we will be able to use renewable energy to generate hydrogen in almost any locality of the nation, and then to use that hydrogen to fuel our aircraft, heat our homes and offices, power our cars, and provide us with electricity.

In these and many other ways, renewable energy and energy efficiency technologies will help reshape America's energy infrastructure from one that relies heavily on foreign supplies and centrally delivered power to one that is decentralized and more dependent on domestic and local resources. And they will help move America toward a more secure energy future.

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